Subpart G—Calculations

§ 1066.601 Overview.

(a) This subpart describes how to—

(1) Use the signals recorded before, during, and after an emission test to calculate distance-specific emissions of each regulated pollutant.

(2) Perform calculations for calibrations and performance checks.

(3) Determine statistical values.

(b) You may use data from multiple systems to calculate test results for a single emission test, consistent with good engineering judgment. You may also make multiple measurements from a single batch sample, such as multiple weighing of a PM filter or multiple readings from a bag sample. You may not use test results from multiple emission tests to report emissions. We allow weighted means where appropriate. You may discard statistical outliers, but you must report all results.

§ 1066.610 Mass-based and molar-based exhaust emission calculations.

(a) Calculate your total mass of emissions over a test cycle as specified in 40 CFR 86.144 or 40 CFR part 1065, subpart G.

(b) For composite emission calculations over multiple test phases and corresponding weighting factors, see the standard-setting part.

Subpart H—Definitions and Other Reference Material

§ 1066.701 Definitions.

The definitions in this section apply to this part. The definitions apply to all subparts unless we note otherwise. Other terms have the meaning given in 40 CFR part 1065. The definitions follow:

Base inertia means a value expressed in mass units to represent the rotational inertia of the rotating dynamometer components between the vehicle driving tires and the dynamometer torque-measuring device, as specified in § 1066.250.

Driving schedule means a series of vehicle speeds that a vehicle must follow during a test. Driving schedules are specified in the standard-setting part. A driving schedule may consist of multiple test phases.

Duty cycle means a set of weighting factors and the corresponding test cycles, where the weighting factors are used to combine the results of multiple test phases into a composite result.

Road-load coefficients means sets of A, B, and C road-load force coefficients that are used in the dynamometer road-load simulation, where road-load force at speed S equals $A + B \cdot S + C \cdot S^2$.

Test phase means a duration over which a vehicle's emission rates are determined for comparison to an emission standard. For example, the standard-setting part may specify a complete duty cycle as a cold-start test phase and a hot-start test phase. In cases where multiple test phases occur over a duty cycle, the standard-setting part may specify additional calculations that weight and combine results to arrive at composite values for comparison against the applicable standards.

Test weight has the meaning given in the standard-setting part.

Unloaded coastdown means a dynamometer coastdown run with the vehicle wheels off the roll surface.

§ 1066.705 Symbols, abbreviations, acronyms, and units of measure.

The procedures in this part generally follow either the International System of Units (SI) or the United States customary units, as detailed in NIST Special Publication 811, which we incorporate by reference in § 1066.710. See 40 CFR 1065.20 for specific provisions related to these conventions. This section summarizes the way we use symbols, units of measure, and other abbreviations.

(a) *Symbols for quantities.* This part uses the following symbols and units of measure for various quantities:

Symbol	Quantity	Unit	Unit symbol	Unit in terms of SI base units
a	acceleration	feet per second squared or meters per second squared.	ft/s² or m/s²	$m \cdot s^{-2}$

Symbol	Quantity	Unit	Unit symbol	Unit in terms of SI base units
d	diameter	meters	m	m
F	force	pound force or newton	lbf or N	$kg \cdot s^{-2}$
f	frequency	hertz	Hz	s^{-1}
I	inertia	pound mass or kilogram	lbm or kg	kg
i	indexing variable			
M	mass	pound mass or kilogram	lbm or kg	kg
N	total number in series			
n	total number of pulses in a series.			
R	dynamometer roll revolutions.	revolutions per minute	rpm	$2 \cdot \pi \cdot 60^{-1} \cdot$ $m \cdot m^{-1} \cdot s^{-1}$
RL	road-load coefficient	horsepower or kilowatt	hp or kW	$10^3 \cdot m^2 \cdot kg \cdot s^{-3}$
S	speed	miles per hour or meters per second.	mph or m/s	$m \cdot s^{-1}$
T	Celsius temperature	degree Celsius	°C	K–273.15
T	torque (moment of force)	newton meter	N·m	$m^2 \cdot kg \cdot s^{-2}$
t	time	second	s	s
Δt	time interval, period, 1/frequency.	second	s	s
y	generic variable			

(b) *Symbols for chemical species.* This part uses the following symbols for chemical species and exhaust constituents:

Symbol	Species
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
NMHC	nonmethane hydrocarbon
NMHCE	nonmethane hydrocarbon equivalent
NO	nitric oxide
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
N_2O	nitrous oxide
O_2	molecular oxygen
PM	particulate mass
THC	total hydrocarbon
THCE	total hydrocarbon equivalent

(c) *Superscripts.* This part uses the following superscripts to define a quantity:

Superscript	Quantity
overbar (such as) $\bar{y}$	arithmetic mean

(d) *Subscripts.* This part uses the following subscripts to define a quantity:

Subscript	Quantity
int	speed interval
abs	absolute quantity
act	actual or measured condition
actint	actual or measured condition over the speed interval
atmos	atmospheric
b	base
c	coastdown
e	effective
error	error
exp	expected quantity
i	an individual of a series
final	final
init	initial quantity, typically before an emission test
max	the maximum (*i.e.,* peak) value expected at the standard over a test interval; not the maximum of an instrument range
meas	measured quantity
ref	reference quantity
rev	revolution
roll	dynamometer roll
s	settling
sat	saturated condition
si	speed interval
span	span quantity
test	test quantity
uncor	uncorrected quantity
zero	zero quantity

(e) *Other acronyms and abbreviations.* This part uses the following additional abbreviations and acronyms:

CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
FID	flame-ionization detector
GVWR	gross vehicle weight rating
NIST	National Institute for Standards and Technology
RESS	rechargeable energy storage system
SAE	Society of Automotive Engineers
U.S.C.	United States Code

§ 1066.710 Reference materials.

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition